

# **NATIONAL BUREAU OF STANDARDS REPORT**

10 622

**IDENTIFICATION OF PREVIOUSLY DEMONSTRATED  
LEAD PAINT POISONING HAZARD ELIMINATION METHODS**



**U.S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS**



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## IDENTIFICATION OF PREVIOUSLY DEMONSTRATED LEAD PAINT POISONING HAZARD ELIMINATION METHODS

Milestone Report (5a)

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U.S. DEPARTMENT OF COMMERCE  
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## Abstract

The elimination methods currently being used by cities having lead hazard detoxification programs have been identified. At the present time very few cities have active programs to alleviate the lead hazard problem. As of September 1971, those cities enforcing laws requiring the removal of the source of the lead poisoning hazard included: Baltimore, Chicago, New Haven, New York, Philadelphia, and Washington, D.C. For the above cities, methods currently being used for lead paint poisoning control, and recommendations made by the cities for elimination of the hazard are given.



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IDENTIFICATION OF PREVIOUSLY DEMONSTRATED  
LEAD PAINT POISONING HAZARD ELIMINATION METHODS

1. INTRODUCTION

At the present time, very few cities have active programs to alleviate the lead hazard problem. The lack of activity in this area can be attributed to the combination of a lack of awareness about the extent and severity of lead poisoning with a severe shortage of funds.

Most city programs are primarily concerned, at the present time, with the screening of children to locate and treat those youngsters showing the symptoms of lead poisoning.

Cities that are presently enforcing laws requiring the removal of the source of the lead poisoning hazard include: Baltimore, Chicago, New Haven, New York, Philadelphia, and Washington, D.C. Since more than 90% of the cases of childhood plumbism are caused by the ingestion of lead paint,<sup>1</sup> this is the area in which the cities have concentrated their attack.

In general, in the cities mentioned above, only those dwelling units where a poisoned child lives or spends a large percentage of his time are treated to remove the source of the hazard. Many other dwellings remain potential sources of lead poisoning but those residences will not be detoxified until a lead poisoning case can be traced to them.

2. HAZARD ELIMINATION METHODS IN USE

In general, two basic hazard elimination techniques are used;; either the hazardous material is removed, or it is covered up.

The degree of removal of the hazardous material or the type of covering used to render it inaccessible determine the effectiveness of the hazard removal solution chosen. For example, if only loose, peeling, blistered, cracked, chewable or chipped paint is removed, the child can still get at the tight lead paint surfaces remaining within his reach by banging on or scratching the wall. In addition, tight paint may become loose paint at some future date. This is especially true in bathrooms and kitchens where moisture tends to cause delamination of the paint from its substrate.

The hazard elimination techniques currently being used in city programs for lead paint poisoning control are listed in Table I.

Recommendations made by the above cities for elimination of the hazard are given in Appendix A of this report.

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<sup>1</sup>Byers, R. K., "Lead Poisoning Review of the Literature and Report on 45 Cases," Pediatrics, p. 589, Vol. 23, March, 1959.

### 3. COMMENTS

The methods presently in use must be evaluated in terms of how effective they are in preventing access to hazardous material by children.

If tight lead paint is left exposed on the walls within reach of a child, such material has a high potential hazard value. This is a result of the fact that a child can gain access to such paint by impact, scratching or gouging. The hazard level in a dwelling would obviously be much lower if all of the paint within the reach of a child was either removed completely, or covered with a durable material that would deny access to the hazardous material. In defining a height to which paint should be removed or covered, one must consider the maximum height that a child less than six years old can reach, taking into account the fact that a child will be able to climb onto a table, chair or sofa. Thus the height that a child can reach while standing on the floor is not significant for this purpose.

A lesser degree of hazard is tight paint beyond the reach of children. Such material still represents a certain degree of potential hazard since it can be loosened by natural causes such as moisture or aging.

It would be desirable to relate the spectrum of hazard removal techniques available to their degree of effectiveness as a solution. One of the goals of this program is to provide guidelines for treating the various hazard elimination methods in this manner.

TABLE I HAZARD ELIMINATION METHODS CURRENTLY IN USE  
(As of September, 1971)

Method	City	Comments (In all cases, doors, and other woodwork, are replaced with necessary)
Remove the Lead Paint Hazard	Baltimore <sup>2</sup>	Heat soften and scrape Sand and wire brush Chemical softening is seldom used because of toxic fumes and clean up problems
	Chicago <sup>3</sup>	Sanding, electric scrapers, no open flame Scraping without softening
	New Haven <sup>4</sup>	Only loose paint removed Scraping mainly, sanding sometimes used Window casements sometimes replaced by redevelopment agency
	New York <sup>5</sup>	On woodwork: sanding or wire brushing, scraping (open flame and toxic or flammable solvents prohibited)
	Philadelphia <sup>6</sup>	Heat softening with open flame or high intensity lamp followed by scraping used Chemical softening hardly used because of time to soften
	Washington, D.C. <sup>7</sup>	Scraping in combination with either open flame or chemical softening Some sanding to remove residual paint
	Baltimore <sup>2</sup>	Any rigid board material children can't get through is permitted. Wood panels, plywood and hardboard are presently used. Wallpaper, contact paper and other materials that a child can either remove or penetrate are not permitted
Cover Up		

Chicago <sup>3</sup>	Cover with plasterboard, In lieu of plasterboard, a heavy fabric wall covering may be used if walls are in good structural condition
New Haven <sup>4</sup>	No requirement for cover up Wallpaper, wood panelling, sheet rock sometimes used. Painting frequently done, but not required. Bad tasting paint is applied over loose and tight leaded material.
New York <sup>5</sup>	Cover with wallboard from floor to ceiling, or cover with wallboard to 4' high and above the height of 4' to the ceiling with heavy coated duck or canvas
Philadelphia <sup>6</sup>	Covering seldom used because of cost
Washington, D.C. <sup>7</sup>	Hardboard, plywood and plaster board mainly used.

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<sup>2</sup>Personal communication, E. Clark with Mr. Dale of the City of Baltimore government.

<sup>3</sup>Personal communication, R. Schulman with Mr. W. Burke of the City of Chicago government.

<sup>4</sup>Personal communication, E. Clark with Mrs. S. Addiss of the City of New Haven government.

<sup>5</sup>Personal communication, R. Schulman with Mr. Clarence Martin of the City of New York government.

<sup>6</sup>Personal communication, E. Clark with Mr. R. Tyler of the City of Philadelphia government.

<sup>7</sup>Personal communication, D. Waksman with Mr. J. W. Haines of the Washington, D.C. government.



## APPENDIX A

### CITY RECOMMENDATIONS FOR HAZARD ELIMINATION

#### I. BALTIMORE

##### Policy Concerning the Removal of Lead Paint in Order to Prevent Lead Paint Poisoning in Children<sup>8</sup>

1. All peeling lead paint to be removed above or below the 4 foot level.
2. Treatment of tight lead paint on certain other surfaces.
  - (a) Window sills - complete removal.
  - (b) Door frames below 4 foot level - complete removal.
  - (c) Windows below 4 foot level including mullions - complete removal.
  - (d) Stair rail spindles - complete removal of 3 sides nearest to steps.
  - (e) Stair treads - removal from lip to riser on bottom and 4" back from lip on top of tread.
  - (f) Doors - removal from chewing edges back 4" on both hinge and latch edges.
  - (g) Stair rails - complete removal.
  - (h) Any surface presenting a chewing surface - complete removal.
3. Tight paint surfaces not requiring removal.
  - (a) Walls in good condition without broken plaster.
  - (b) Baseboards
  - (c) Skirtboards on stairways
  - (d) Step risers
  - (e) Chairboards except where they present a chewing surface.
  - (f) Any surface below the 4 foot level not presenting a chewing surface.

In accordance with the above policy, lead paint sampling will be limited to the surfaces listed above for removal.

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<sup>8</sup> Quoted from form SS-636 of the Baltimore City Health Department.

## II. CHICAGO

### Specifications for the Removal of Lead Paint<sup>9</sup>

In any case, where analysis reveals the presence of lead or its compounds in a quantity of more than 1 percent, or in a quantity sufficient to be a hazard to health and safety to the occupants of the family unit, the Commissioner of Buildings shall order the owner or his agent to remove all material containing lead compounds or cover such surfaces with an acceptable covering having a flame spread rating not to exceed 15. All covering shall be securely attached to a smooth and sound surface.

Comments: This means that the lead bearing substance must be removed or covered with a substantial material such as plasterboard, plaster or a heavy grade of fabric wall covering. Fabric wall covering may only be applied to structurally sound walls which are free of cracks and loose portions of plaster. We will not accept scraping off the loose or peeling paint and then repainting the entire surface. Repainting is not considered an acceptable covering because it does not provide an effective or substantial barrier to the lead paint that lies beneath it. Wood, pressed fiber board, particle board or other similar panelling will not be accepted as a wall covering because its flame spread rating exceeds 15.

The corrective measures necessary to comply with the code are dictated by the condition or the surfaces involved. The recommended procedure is to cover the walls with plasterboard and to seal, tape and paint said plasterboard. However, if the subject walls are in good structural condition, all loose or peeling paint is scraped off, and all cracks, holes or voids are adequately patched, the surface may be covered with a heavy grade of fabric wall covering in lieu of plasterboard or plaster. The adhesive used must be resistant to water, mold and fungus and the fabric covering must be applied so as to form a tight union with the wall in order to prevent the possibility of creating an insect or rodent harborage. Woodwork may be scraped down to the bare wood and then repainted, but normally it is more economical and efficient to replace the woodwork.

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<sup>9</sup>Quoted from the City of Chicago, Department of Buildings' Municipal Code of Chicago, Sec. 78-18.2

## CHICAGO (Cont.)

### Temporary Repairs to Defective Walls & Woodwork Containing Lead Bearing Paint

Childhood lead poisoning is most frequently caused by children eating paint chips, broken plaster, or chewing on windowsills and woodwork where lead paint has been used. Since the degree of poisoning depends upon the amount of paint eaten, it is important that immediate steps be taken to remove all blistered, peeling, or other loose paint or plaster accessible to children.

It is suggested that all loose paint on walls and ceilings be scraped with a 4" putty knife or similar tool and all chips removed be immediately swept up and discarded. Where plaster is damaged and small holes are evident these holes should be covered by several layers of masking tape, . . . .tape, or common adhesive tape. Larger holes may be covered by applying a covering of . . . . paper or cloth or cardboard patch using wallpaper paste and applying masking tape, . . . .tape or . . . .tape around the edges.

Where children have been chewing on woodwork, these areas may be covered with several layers of tape or . . . . paper.

It is important to realize that these measures are just temporary remedies and in all cases these patches must be kept under observation to insure that children do not remove these patches.

### III. NEW HAVEN

(1) City ordinance - Section 16-7<sup>10</sup>

- (a) No paint which does not conform to the standards of the United States of America Standards Institute Z66.1-1964 shall be used on any exterior surface accessible to children or on any wall, ceiling, floor, interior woodwork or on or around the interior or exterior surface of any door, window, fixture, stairs, railing or porch, on any dwelling, or dwelling unit or any building intended or used, in whole or part, for human habitation or occupancy.
- (b) Interior and exterior surfaces of walls, ceilings, floors, interior woodwork, doors, windows, fixtures, stairs, railings and porches in and on all dwellings or dwelling units or any building or structure whether public or private, shall be kept free of cracked, chipped, blistered, flaking, loose, or peeling paint.
- (c) Where the Director of Health finds that the presence of cracked, chipped, blistered, flaking, loose or peeling paint constitutes a health hazard, he shall issue an order to the owner of the property upon which such hazard exists to eliminate such hazard under such safety conditions as he may approve. Such paint shall be completely removed from any surface which can be chewed or eaten by children or is otherwise accessible to children. In lieu of removal of such paint, such surface shall be covered with a durable material or substance approved by the Director of Health. Repainting of any surface without prior removal of hazardous paint thereon or prior preparation of any such surface in accordance with such conditions as the Director of Health may approve shall not be deemed to be satisfactory compliance with this section.

(2) Paragraph 302 (h) of the Housing Code of the City of New Haven is hereby amended to read as follows:

- (h) Interior and exterior surfaces of walls, ceilings, floors, interior woodwork, doors, windows, fixtures, stairs, railings, porches and other interior and exterior surfaces accessible to children shall be kept free of cracked, chipped, blistered, flaking, loose, or peeling paint or any paint the use or presence of which violates Section 16-7 of the Code of Ordinances.

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<sup>10</sup>Quoted from Section 16-7 of the Code of Ordinances of the City of New Haven.



NEW HAVEN (Cont.)

(3) Permissible paint removal methods<sup>11</sup>

- a) Application of paint removers
- b) Sanding
- c) Scraping
- d) Steaming
- e) Burning with torches
- f) Chemical paint removers and steamers in combination

Methods of removal must be approved by health authorities to eliminate the possibility of additional hazards.

- (4) Tight paint is removed only from those surfaces showing evidence of chewing.<sup>12</sup> In cases where one window shows signs of chewing, removal of paint from this window and other windows having the same color of paint will be required.

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<sup>11</sup>Letter dated September 27, 1971 from E. Whitmire of the City of New Haven government to M. Godette.

<sup>12</sup>Personal communication, E. Clark with E. Whitmire of the City of New Haven government.

#### IV. NEW YORK

##### Specifications for the Removal of Lead Paint

##### ORDER TO LANDLORD/AGENT<sup>13</sup>

1. All cracks, breaks and other openings in walls must be plastered smooth and continuous, and the walls must be free of loose, scaling or peeling paint.
2. The walls must be covered with wallboard from the floor to the ceiling, or,
3. The walls must be covered with wallboard to a height of four feet from the floor, and above the height of four feet to the ceiling the walls must be covered with fabric such as heavy duty coated duck or canvas. The adhesive to be used must be resistant to water, mold and fungus. Wallboard must be coated with paint containing no more than 1% of metallic lead.
4. There must be installed at the junctures of the wall and ceiling, wall and floor and wallboard and fabric, new moldings properly installed to protect against loosening of the covering applied and to prevent insect and rodent harborage.
5. All cracks, breaks and other openings in ceilings must be plastered smooth and continuous, the ceilings must be free of loose, scaling or peeling paint, and the surface must be coated with a paint or other substance containing no more than 1% of metallic lead.
6. The window sills and frames, cabinets, doors and frames, and other interior wooden and metal surfaces must be replaced by new material or the paint thereon must be removed to the wood or metal by one or more of the methods described below and must be coated with paint containing no more than 1% metallic lead.

##### PERMISSIBLE METHODS OF PAINT REMOVAL

There are three possible methods for the removal of paint from interior surfaces:

- a) Use of solvents;
- b) Burning or softening and scraping;
- c) Sanding or wire brushing.

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<sup>13</sup>Quoted from the Order to Landlord/Agent from the Commissioner of Health of the City of New York.

NEW YORK (Cont.)

The use of solvents within an apartment or dwelling is not permitted unless the solvent is both non-flammable and its fumes are non-toxic.

Burning or softening by open flame within a dwelling are not permitted by Fire Department regulations.

Sanding or wire brushing create a dispersion of finely divided lead dust. These operations must, therefore, be limited to vacant apartments with the operator using an effective respirator.

Window sills, baseboards, doors, window sashes may be removed to an outdoor location for paint removal.

## V. PHILADELPHIA

### Specifications for the Removal of Lead Paint<sup>14</sup>

Remove all layers of lead paint to the length, width and height as indicated:

- Cracked, chipped, blistered, peeling or other loose lead paint shall be completely removed wherever found, holes and cracks in walls must be repaired.
- Windows, sills and frames below 5 foot level - complete removal.
- Doors and frames below 5 foot level - removal 4 inches back on hinge and latch edges of door, complete removal from frame.
- Handrails - complete removal.
- Spindles (Balusters) - removal on surfaces adjacent to walking areas.
- Stair treads - removal 4 inches back from lip on top of tread and from lip to riser on bottom side.
- Other chewable surfaces below 5 foot level - removal 4 inches back from edge.

TIGHT LEAD PAINT surfaces which do not require removal include: walls in good condition without broken areas, baseboards, skirtboards on stairways, step risers, and any other surface below the 5 foot level not presenting a chewable surface.

IN LIEU OF REMOVAL of the lead paint as specified above, the surface shall be covered with an approved durable material. Such materials may include metal, hard fiber board, tile, plastic board, or any other material approved by the Department.

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<sup>14</sup>Quoted from Specifications for the Removal of Lead Paint of the Philadelphia Department of Public Health Community Health Services.

## VI. WASHINGTON, D.C.

### Specifications for the Removal of Lead Paint

#### REMOVAL OF LEAD PAINT<sup>15</sup>

Window sills and frames, doors and door frames, handrails, balustrades, and stair treads must be replaced by new material or the lead base paint thereon must be removed to its base surface to the length, width, and height as indicated below:

Cracked, chipped, blistered, peeling or other loose lead base paint shall be completely removed wherever found, holes and cracks in walls must be repaired

Windows, sills and frames below 5 foot level - complete removal

Doors and frames below 5 foot level - removal 4 inches back on the hinge and latch edges of door, complete removal from frame

Handrails - complete removal

Balustrades - removal on surfaces adjacent to walking areas

Stair treads - removal 4 inches back from lip to riser on bottom side

Other chewable surfaces below 5 foot level - removal 4 inches back from edge

Do not repaint areas until inspected by the Housing Division to determine if the hazard has been eliminated. Repainting a surface with a non-lead paint without the complete removal of the existing lead base paint shall not be deemed to be satisfactory compliance.

#### PERMISSIBLE METHODS OF PAINT REMOVAL

There are three possible methods for the removal of paint from interior surfaces:

- a) Use of solvent;
- b) Burning or softening and scraping,
- c) Sanding or wire brushing.

The use of solvents within an apartment or dwelling is not permitted unless the solvent is both non-flammable and its fumes are non-toxic.

Any person using a torch or flame producing device in the repair, remodeling, alteration or renovation of any building shall provide an approved fire extinguisher or water hose connected to an available water supply for use in case of fire.

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<sup>15</sup>Quoted from Instructions for the Correction of Hazardous Conditions Caused by Toxic Lead Base Paint of Washington, D.C., Form ED-H-132a, dated 7-16-71.



WASHINGTON, D.C. (Cont.)

Sanding or wirebrushing creates a dispersion of finely divided lead dust. These operations must, therefore, be limited to vacant apartments with the operator using an effective respirator.

Window sills, baseboards, doors, window sashes may be removed to an outdoor location for paint removal.

ACCEPTABLE DURABLE MATERIALS

In lieu of removal of the lead base paint as specified above, lead base paint interior surfaces may be covered with an approved durable material. Such materials may include metal, gypsum board, composition paneling, wood paneling, tile or any other durable material approved by the Department.

Walls covered with a durable material to a height of five feet from the floor must have at the junctures of the wall and floor and top of covering, a suitable holding, properly installed to protect against loosening of the covering applied and to prevent insect and rodent harborage.

Comment: Tight paint is not removed below the 5 foot level if chewable surfaces are not present.<sup>16</sup>

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<sup>16</sup>Personal communication, D. Waksman with C. Fowler of the Washington, D.C. government.



